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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/833,078	04/12/2001	David A. Thompson	45-35	1456
27557	7590	11/28/2003	EXAMINER	
BLANK ROME LLP 600 NEW HAMPSHIRE AVENUE, N.W. WASHINGTON, DC 20037			LOUIE, WAI SING	
			ART UNIT	PAPER NUMBER
			2814	

DATE MAILED: 11/28/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

RF

<b>Office Action Summary</b>	<b>Application No.</b> 09/833,078	<b>Applicant(s)</b> THOMPSON ET AL.	
	<b>Examiner</b> Wai-Sing Louie	<b>Art Unit</b> 2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☐ Responsive to communication(s) filed on 15 September 2003.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-7, 15, 16 and 22-29 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4, 15, 16, 22-27 and 29 is/are rejected.
- 7) ☒ Claim(s) 5-7 and 28 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

#### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-4, 15-16, 23-27, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takiguchi et al. (US 5,671,242), previously used, in view of Elman et al. (US 5,238,868), previously used.

With regard to claims 1, 3, 27, and 29, Takiguchi et al. disclose the method of manufacturing a quantum well structure (col. 5, line 15 to col. 11, line 17 and fig. 1) comprising:

- Providing a quantum well structure comprising an indium gallium arsenide phosphide (InGaAsP) quantum well active region (col. 5, lines 17-34 and fig. 1);
- Takiguchi et al. disclose the quantum well layers are grown with crystalline defects at the surface (col. 6, lines 30-48);
- Takiguchi et al. do not disclose applying a rapid thermal annealing (RTA) process for controlling diffusion of the defects in the semiconductor layer into the InGaAsP quantum well active region. However, Elman et al. disclose by inter-diffusing the arsenic vacancies (interstitial type defects) from the created disordered region 11 into the quantum well active region (Elman col. 2, lines 44-47) and RTA to generate inter-diffusion of defects into the quantum well active region (Elman col. 2, lines 44-47).

and col. 4, lines 20-22). Elman et al. teach the quantum well bandgap could be tuned by this intermixing technique without inducing defects and modifying the optical bandgap of the quantum well (Elman col. 2, lines 47-53). Therefore, it would have been obvious to one with ordinary skill in the art to modify Takiguchi's device with the teaching of Elman et al. to thermal anneal the structure in order to generate the quantum well intermixing to modify the bandgap of the quantum well structure.

With regard to claims 2 and 4, Takiguchi et al. do not disclose the InP layer is epitaxial grown by means of molecular beam epitaxy (MBE). However, it is common in the art to select the MBE, which is the best technique to form the semiconductor compound including the selected defects in the layer, such as disclosed in Elman et al. at low temperature (Elman col. 4, line 7). Takiguchi et al. modified by Elman et al. do not disclose antisite defects. However, Elman et al. disclose the diffusion of defects in the same manner, as the present application, therefore, the sitting of molecular structure must be the same.

With regard to claims 15-16 and 23-25, Takiguchi et al. do not disclose the thickness of the low temperature grown InP layer is in a range of 0-140 nm or more. However, since the applicant has not established the criticality of the thickness stated and since this thickness are in common use in similar devices in the art, it would have been obvious to one of ordinary skill in the art to use this value in the device of the thickness. Where patentability is said to be based upon particular chosen dimension or upon another variable recited in a claim, the applicant must show that the chosen dimensions are critical. In re Woodruff, 919 F2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990). Haysom et al. disclose the annealing is done in a single thermal anneal step (Haysom page 56, right column).

With regard to claim 26, Takiguchi et al. disclose a first indium phosphorous layer 4 (col. 5, line 32).

Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takiguchi et al. (US 5,671,242) in view Freundlich et al. (US 5,851,310).

With regard to claim 22, Takiguchi et al. do not disclose the InP layer is grown by means of a reduced temperature MBE process at a temperature of 300 °C. However, Freundlich et al. disclose the condition of growth by MBE system (Freundlich col. 4, line 49) at a lower temperature of 300 °C (Freundlich col. 6, line 39). Freundlich et al. teach the low temperature prevents the degradation of the characteristic (i.e., uniformity in composition or thickness) of the semiconductor layer (Freundlich col. 4, lines 30-46). Therefore, it would have been obvious to one with ordinary skill in the art to modify Takiguchi's device with the teaching of Freundlich et al. to provide a low temperature of 300 °C in order to produce a uniform semiconductor layer.

#### ***Allowable Subject Matter***

Claims 5-7 and 28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

#### ***Response to Arguments***

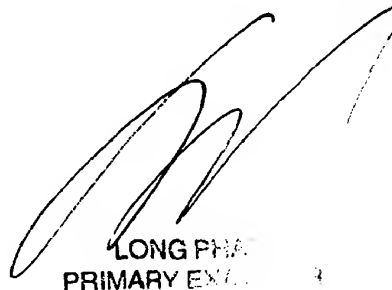
Applicant's arguments filed 9/15/03 have been fully considered:

- Applicant argues that the previous office action relies on Elman et al. for the teaching to tune a quantum well bandgap by an intermixing technique, where the defect is implanted in surface of the layer above the MQW. The present invention is to grow the layer includes the defects. However, Takiguchi et al. disclose the MQW layers are grow with the surface defects, which meets the claim limitation.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wai-Sing Louie whose telephone number is (703) 305-0474. The examiner can normally be reached on 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (703) 308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.



LONG PHAM  
PRIMARY EXAMINER



wsl

November 17, 2003